

**In the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. *(Currently Amended)* A transfer apparatus for transferring an object, comprising:  
a gripper for at least one of (a) gripping the object at a first position and releasing said object at a second position proximate to a receiver and (b) releasing said object at a first position after gripping said object at a second position proximate to said receiver;

a measurement device, separate and displaced from said gripper, configured to measure a relative position of said gripper with respect to said receiver in at least one direction,

wherein a relative position error is determined with respect to a desired relative position of said gripper with respect to said receiver, the determination based on the measured relative position of said gripper with respect to said receiver, and the relative position of the gripper with respect to said receiver is adjusted based on the reduction of the relative position error at the second position and a difference in relative velocity or acceleration between said gripper and said receiver is minimized.

2. *(Original)* The transfer apparatus of Claim 1, wherein said object comprises a substrate and said receiver comprises a substrate holder.

3. *(Original)* The transfer apparatus of Claim 1, wherein said object comprises a mask and said receiver comprises a mask support structure.

4. *(Previously Presented)* The transfer apparatus of Claim 1, wherein the relative position of said gripper with respect to said receiver is measured by measuring the relative position between a first reference point of said receiver and a second reference point of said gripper.

5. (Original) The transfer apparatus of Claim 1, wherein said measurement device comprises at least one sensor provided on said receiver and a first reference point is provided on said sensor and a second reference point is provided on said gripper or said object on said gripper.

6. (Currently Amended) The transfer apparatus of Claim 1, further comprising ~~wherein said measurement device comprises at least one sensor is provided on said gripper and~~ wherein a first reference point is provided on said sensor and a second reference point is provided on said receiver.

7. (Original) The transfer apparatus of Claim 1, wherein said measurement device comprises at least one sensor provided on a frame that is relatively stable with respect to said gripper and said receiver, and a first reference point is provided on said gripper or said object on said gripper and a second reference point is provided on said receiver.

8. (Previously Presented) The transfer apparatus of Claim 1, wherein said transfer apparatus comprises a mechanical docking structure configured to dock said gripper to a frame and said measurement device comprises at least one sensor provided on said frame that is relatively stable with respect to said gripper and said receiver, and a reference point is provided on said receiver.

9. (Cancelled)

10. (Cancelled)

11. (Previously Presented) The transfer apparatus of Claim 1, wherein said measurement device is adapted to measure the relative position in at least two directions.

12. *(Original)* The transfer apparatus of Claim 1, wherein the relative position error is additionally determined by using information regarding the relative position of said object relative to said gripper.

13. *(Withdrawn – Currently Amended)* A lithographic apparatus, comprising:  
a support structure configured to support a patterning device that imparts a beam of radiation with a desired pattern;  
a substrate holder configured to hold a substrate;  
a projection system configured to project said patterned beam of radiation onto a target portion of said substrate; and

a transfer apparatus for transferring said patterning device, wherein said transfer apparatus comprises:

a gripper for at least one of (a) gripping said patterning device at a first position and releasing said patterning device at a second position proximate to said support structure and (b) releasing said patterning device at a first position after gripping said patterning device at a second position proximate to said support structure, and

a measurement device, separate and displaced from said gripper, configured to measure a relative position of said gripper with respect to said support structure in at least one direction,

wherein a relative position error is determined with respect to a desired relative position of said gripper with respect to said receiver, the determination based on the measured relative position of said gripper with respect to said receiver, and the relative position of the gripper with respect to said receiver is adjusted based on the reduction of the relative position error at the second position and a difference in relative velocity or acceleration between said gripper and said receiver is minimized.

14. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 13, wherein the relative position of said gripper with respect to said support structure is measured by

measuring the relative position between a first reference point of said support structure and a second reference point of said gripper.

15. *(Withdrawn – Currently Amended)* The lithographic apparatus of Claim 13, ~~wherein said measurement device comprises~~ further comprising at least one sensor provided on said support structure and wherein a first reference point is provided on said sensor and a second reference point is provided on said gripper or said patterning device on said gripper.

16. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 13, wherein said measurement device comprises at least one sensor provided on said gripper and a first reference point is provided on said sensor and a second reference point is provided on said support structure.

17. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 13, wherein said measurement device comprises at least one sensor provided on a frame that is relatively stable with respect to said gripper and said support structure, and a first reference point is provided on said gripper or said patterning device on said gripper and a second reference point is provided on said support structure.

18. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 13, wherein said transfer apparatus comprises a mechanical docking structure configured to dock said gripper to a frame and said measurement device comprises at least one sensor provided on said frame that is relatively stable with respect to said gripper and said support structure, and a reference point is provided on said support structure.

19. *(Cancelled)*

20. *(Cancelled)*

21. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 13, wherein said measurement device is adapted to measure the relative position in at least two directions.

22. *(Withdrawn – Currently Amended)* A lithographic apparatus, comprising:  
a support structure configured to support a patterning device that imparts a beam of radiation with a desired pattern;

a substrate holder configured to hold a substrate;

a projection system configured to project said patterned beam of radiation onto a target portion of said substrate; and

a transfer apparatus for transferring said substrate, wherein said transfer apparatus comprises:

a gripper for at least one of (a) gripping said substrate at a first position and releasing said substrate at a second position proximate to said substrate holder and (b) releasing said substrate at a first position after gripping said substrate at a second position proximate to said substrate holder, and

a measurement device, separate and displaced from said gripper, configured to measure a relative position of said gripper with respect to said substrate holder in at least one direction,

wherein a relative position error is determined with respect to a desired relative position of said gripper with respect to said receiver, the determination based on the measured relative position of said gripper with respect to said receiver, and the relative position of the gripper with respect to said receiver is adjusted based on the reduction of the relative position error at the second position and a difference in relative velocity or acceleration between said gripper and said receiver is minimized.

23. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 22, wherein the relative position of said gripper with respect to said substrate holder is measured by

measuring the relative position between a first reference point of said substrate holder and a second reference point of said gripper.

24. *(Withdrawn – Currently Amended)* The lithographic apparatus of Claim 22, ~~wherein said measurement device comprises~~ further comprising at least one sensor provided on said substrate holder and wherein a first reference point is provided on said sensor and a second reference point is provided on said gripper or said substrate on said gripper.

25. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 22, wherein said measurement device comprises at least one sensor provided on said gripper and a first reference point is provided on said sensor and a second reference point is provided on said substrate holder.

26. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 22, wherein said measurement device comprises at least one sensor provided on a frame that is relatively stable with respect to said gripper and said substrate holder, and a first reference point is provided on said gripper or said substrate on said gripper and a second reference point is provided on said substrate holder.

27. *(Withdrawn – Previously Presented)* The lithographic apparatus of Claim 22, wherein said transfer apparatus comprises a mechanical docking structure configured to dock said gripper to a frame and said measurement device comprises at least one sensor provided on said frame that is relatively stable with respect to said gripper and said substrate holder, and a reference point is provided on said substrate holder.

28. *(Cancelled)*

29. *(Cancelled)*

30. (*Withdrawn – Previously Presented*) The lithographic apparatus of Claim 22, wherein said measurement device is adapted to measure the relative position in at least two directions.

31. (*Currently Amended*) A method of transferring an object via a gripping device, said method comprising:

gripping with said gripping device at least one of (a) said object at a first position and releasing said object at a second position proximate to a receiving structure and (b) releasing said object at a first position after gripping said object at a second position proximate to said receiving structure,

measuring a relative position of said gripping device with respect to said receiving structure in at least one direction using a measurement device separate and displaced from said gripping device,

determining a relative position error with respect to a desired relative position based on the measured relative position, and

adjusting relative position of said gripping device with respect to said receiving structure to minimize the relative position error and the difference in relative velocity or acceleration between said gripper and said receiver, at the second position.

32. (*Withdrawn- Currently Amended*) A device manufacturing method, comprising:

providing a beam of radiation using a radiation system;

imparting a desired pattern onto said beam of radiation by a patterning device;

providing a substrate that is held by a substrate holder;

transferring said substrate via a gripping device, said transferring including:

gripping with said gripping device at least one of (a) said substrate at a first position and releasing said substrate at a second position proximate to the substrate holder and (b) releasing said substrate at a first position after gripping said substrate at a second position proximate to the substrate holder,

measuring a relative position of said gripping device with respect to said substrate holder in at least one direction using a measurement device separate and displaced from said gripping device,

determining a relative position error with respect to a desired relative position based on the measured relative position, and

adjusting relative position of said gripping device with respect to said substrate holder to minimize the relative position error and the difference in relative velocity or acceleration between said gripper and said substrate holder, at the second position; and

projecting said patterned beam of radiation onto a target portion of said substrate.

33. *(Withdrawn- Currently Amended)* A device manufacturing method, comprising:
- providing a substrate;
  - providing a beam of radiation using a radiation system;
  - imparting a desired pattern onto said beam of radiation by a patterning device, said patterning device being supported by a support structure;
  - transferring said patterning device via a gripping device, said transferring including:
    - gripping with said gripping device at least one of (a) said patterning device at a first position and releasing said patterning device at a second position proximate to the support structure and (b) releasing said patterning device at a first position after gripping said patterning device at a second position proximate to the support structure,
    - measuring a relative position of said gripping device with respect to said support structure in at least one direction using a measurement device separate and displaced from said gripping device,
    - determining a relative position error with respect to a desired relative position based on the measured relative position, and
    - adjusting relative position of said gripping device with respect to said support structure to minimize the relative position error and the difference in



relative velocity or acceleration between said gripper and said support structure, at  
the second position; and  
projecting said patterned beam of radiation onto a target portion of said substrate.